Appendix C

Ocean Dredged Material Disposal Site Analyses

Ocean Dredged Material Disposal
Site Analyses

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OCEAN DREDGED MATERIAL DISPOSAL SITE ANALYSES

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1.0 INTRODUCTION

The existing Freeport Harbor Project was authorized by the River and Harbors Acts of May 1950 and July 1958, providing for an Entrance Channel of 38-foot (ft) depth and 300-ft width from the Gulf to a point inside the jetties and for inside channels of 36-ft depth and 200-ft width up to and including the Upper Turning Basin. In 1970, Congress passed Section 101 of the River and Harbors Act of 1970 (PL 91-611; House Document 289, 93rd Congress – 2nd Session, 31 December 1975) and in 1974, the President authorized the relocation and deepening of the Jetty Channel to 45-ft depth and 400-ft width and the Entrance Channel to 47-ft depth and 400-ft width, with an extension of approximately 4.6 miles into the Gulf.

The Brazos River Harbor Navigation District (BRHND) of Brazoria County, Texas (also known as Port Freeport) applied to the U.S. Army Corps of Engineers (USACE), Galveston District, for a Clean Water Act Section 404 permit and Rivers and Harbors Act Section 10 permit for dredge and fill activities related to the widening of portions of the Freeport Ship Channel on April 14, 2005. Activities subject to the jurisdiction of the USACE would include dredging in navigable waters to widen portions of the Freeport Harbor Jetty Channel and all of the Freeport Harbor Entrance Channel and placement of fill in waters of the U.S. This Ocean Dredged Material Disposal Site (ODMDS) Analyses document is being circulated for review as an appendix to the Environmental Impact Statement (EIS) being prepared for the proposed channel widening project.

1.1 PROPOSED WIDENING PROJECT

Port Freeport proposes to widen, but not deepen, portions of the Freeport Harbor Jetty Channel and all of the Freeport Harbor Entrance Channel. Beginning at Channel Station 63+35, which is just about even with the center of the U.S. Coast Guard (USCG) Station access channel, the Jetty Channel will be gradually widened, at the authorized depth, up to an additional 150 ft over the next 1,835 ft to Channel Station 45+00. Over the next 500 ft, to Channel Station 40+00, the widening will be less gradual and will go from the additional 150 ft to an additional 200 ft. From Channel Station 40+00, through the rest of the Jetty Channel and to the end of the Entrance Channel at Channel Station -260+00, the channel will be widened an additional 200 ft. The length of channel that is proposed for widening is 32,335 ft or 6.1 miles, of which 5.7 miles will be widened by 200 ft. Port Freeport proposes to place new work (or construction or virgin) dredged material in the 45-ft Project new work material ODMDS and maintenance material in the existing U.S. Environmental Protection Agency (EPA) ODMDS for maintenance material (Figure C.1-1).

1.1.1 Project Purpose and Need

The purpose of the proposed project is to widen the channel to eliminate existing operational constraints that include (a) one-way traffic, (b) daylight-only operations for larger vessels, and (c) restrictions that do not allow the larger vessels to enter the Port when winds exceed 20 knots or crosscurrents exceed

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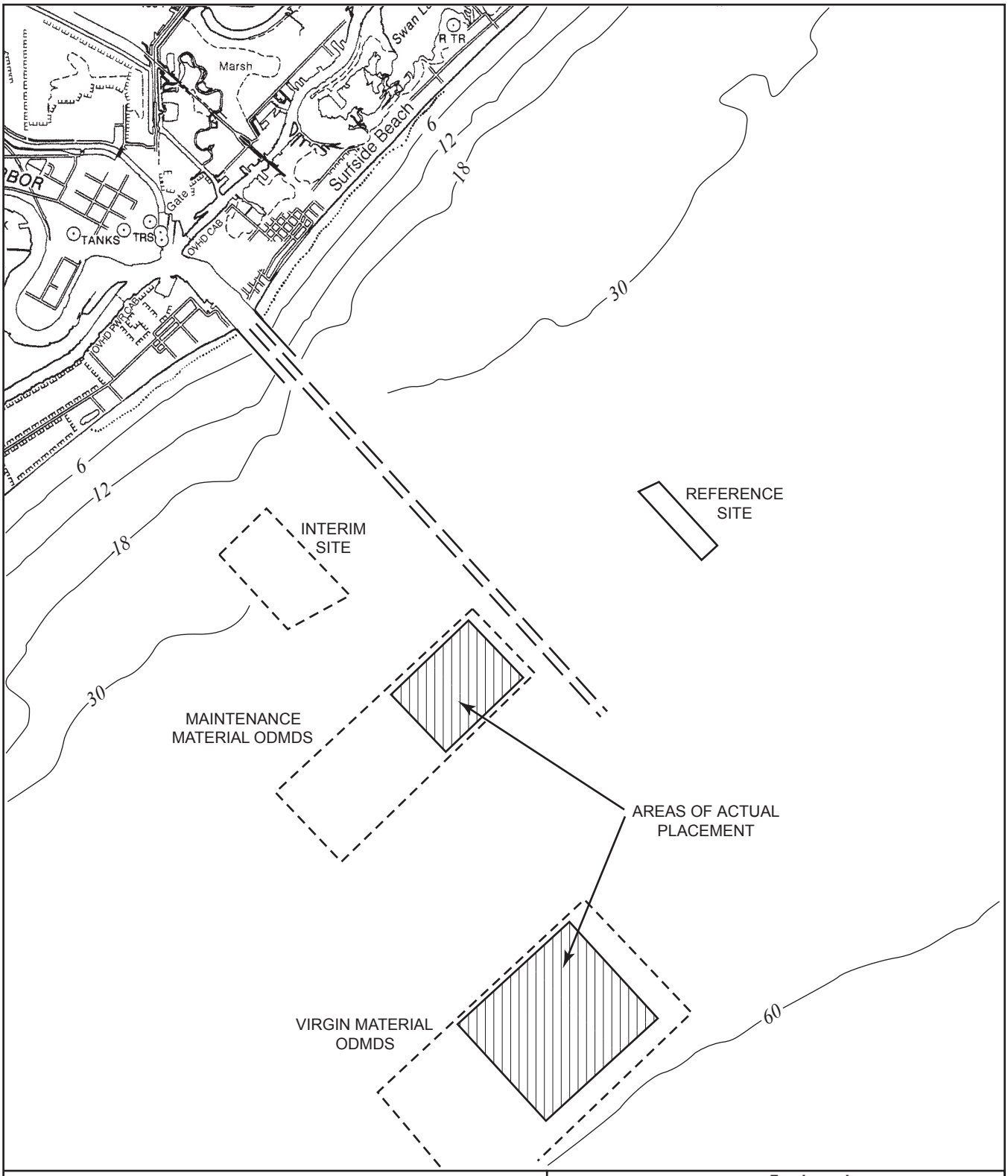

Base Map: NOAA Navigation Chart 11321 (1990)

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• Engineering
• Environmental Consulting
• Surveying

Figure C.1-1

GENERAL BATHYMETRY
AND ODMDSs
PORT FREEPORT, TEXAS

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0.5 knot. The maximum ship dimensions permitted by the pilots at Freeport Harbor are: 825-ft length over all (LOA), 145-ft maximum beam, and 42-ft draft.

The project need is the elimination of the operational constraints to allow vessels to avoid delays, thereby reducing shipping costs and logistical problems and increasing vessel safety. In the 905(b) analysis (USACE, 2002), the USACE noted the problems mentioned above; i.e., "that the relatively narrow (400-ft wide) entrance and main channels limit the Freeport Harbor Channel to one-way for all vessels and daylight-only operation for the larger vessels." It is also noted that "the light-loading, one-way traffic, and daylight-only operation result in significantly higher costs to users of Port Freeport than would be experienced if the harbor were enlarged and deepened. The transportation savings that would result from improvements at Freeport Harbor would be economic benefits to the nation." Thus the USACE has confirmed the need for the project and that the project serves the national interest.

1.1.2 Project Alternatives

Design parameters for channel dimensions are normally based on the channel width versus the maximum vessel beam allowed to transit the channel. Two possible widths (500 and 600 ft) were examined as alternatives for the proposed channel widening project. Since studies (Fugro Consultants, Inc. [Fugro], 2005) showed that the maximum channel width should not exceed 600 ft to maintain jetty stability (550 ft inside Channel Station 38+00) and since the USACE had selected 600 ft as the maximum width alternative (USACE, 2002), 600 ft was the maximum width examined. An analysis indicated that the 600-ft width is preferred over the 500-ft width to effectively meet the purpose and need for the project.

The proposed widening would generate approximately 3.2 million cubic yards (mcy) of new dredged material. Approximately 2.9 mcy of the new work material would consist of clay material and about 300,000 cubic yards (cy) would consist of silty sand. A Dredged Material Management Plan (DMMP) Workgroup, comprising state and Federal agency representatives and other entities, met to discuss the potential alternatives for dredged material placement. Additional information regarding the DMMP Workgroup can be found in Section 2.3 of the EIS. Seventeen placement alternatives were identified and considered by the DMMP Workgroup. These alternatives included upland confined placement areas (UCPA), beach nourishment, marsh restoration, upland beneficial use (BU), offshore BU, and use of an ODMDS.

These BU alternatives were subjected to a preliminary screening process to determine feasibility. Through this process, it was determined that the physical characteristics of the clay material made it unsuitable for the BUs being considered. The three offshore potential BU sites (habitat, feeder, and energy dissipating berms) were removed from further consideration by the DMMP Workgroup or the Applicant for various reasons, including reliability as a BU, lack of permanence, and/or overall performance.

Placement of the 300,000 cy of silty/sand new work material at either Surfside Beach or placement on Quintana Beach in front of the Seaway UCPA was determined to be another BU option. Three potential marsh restoration BU areas were identified during a DMMP workshop in December 2005, but the

ultimate consensus of the Workgroup was that none of the marsh restoration sites were desirable or feasible (EIS Section 2.3). Therefore beach nourishment at either Quintana or Surfside remained as a viable BU placement option for the 300,000 cy of new work material. The two alternative locations, Surfside and Quintana, are both carried through the EIS for complete analysis, along with the No-Action alternative.

Since a BU was available for the sandy material, all non-BU options, including ocean placement, were eliminated for the sandy material. Once it was determined the 1.9 mcy of clay material were not viable for the BU alternatives being considered, several upland placement options were considered. However, the upland placement areas either did not have capacity to accept the material or were designated for other uses. The major portion of the dredging of the clay material will be dredged by hopper dredge and, therefore, ocean placement was selected as the preferred alternative for placement of this material.

1.2 ODMDS DESIGNATION

Ocean disposal of dredged material was not specifically regulated in the United States until passage of the Marine Protection, Research and Sanctuaries Act of 1972 (MPRSA). Limited regulation was provided by the Supervisors' Act of 1888 and the Refuse Act of 1899. Under these acts, transportation and navigation factors, rather than environmental considerations, guided selection of placement locations by the USACE and the issuance of permits for ocean disposal.

Although the Fish and Wildlife Coordination Act of 1958 initially referred to inland tidal waters, it included consideration of the effects of dredged material on commercially important marine species. This act, together with subsequent judicial decisions, empowered the USACE to refuse permits if the dredging or filling of a bay or estuary would result in significant, unavoidable damage to the marine ecosystem.

MPRSA and the Federal Water Pollution Control Act (FWPCA), later amended by the Clean Water Act of 1977, both passed in 1972 and specifically addressed waste disposal in the aquatic and the marine environment. The FWPCA and the Water Quality Improvement Act of 1970 set up specific water-quality criteria to be used as guidelines in controlling discharges into marine and aquatic environments. These water-quality criteria applied to placement of dredged material only in cases where fixed pipelines were used to transport and discharge dredged material into the environment at discrete points. MPRSA, however, specifically regulates the transport and ultimate disposal of waste materials in the ocean. Under Title I of MPRSA, the primary regulatory vehicle of the Act, a permit program for the disposal of dredged and nondredged materials was established that mandates determination of impacts and provides for enforcement of permit conditions.

The August 1975 London Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (Convention) is the principal international agreement governing ocean dumping. The Convention specifies that contracting nations will regulate disposal in the marine environment within their jurisdiction, disallowing all disposal without permits. The nature and quantities of all waste material and the circumstances of disposal must be periodically reported to the International Maritime

Organization (formerly the Inter-Governmental Maritime Consultative Organization), which administers the Convention.

In October 1973, the EPA issued the final Ocean Dumping Regulations and Criteria (the Regulations or Ocean Dumping Regulations), revised in January 1977 (40 CFR Parts 220 to 229). These regulations established procedures and criteria for review of ocean disposal permit applications (Part 227); assessment of impacts of ocean disposal and alternative disposal methods; enforcement of permits; and designation and management of ocean disposal sites (Part 228). They also established procedures by which the EPA is authorized to designate ODMDSs and times for ocean disposal of acceptable materials under Section 102(c) of the MPRSA and the criteria for site designation, including general and specific criteria for site selection.

The EPA is mandated with the authority to regulate ocean dumping and with the responsibility for site designation, monitoring, and management by Congress as stated specifically in 40 CFR 228.4(e)(1). The EPA has been requested to redesignate an ODMDS site for the placement of construction material and approve placement of maintenance material in an existing designated maintenance material ODMDS for the Freeport Harbor Entrance and Jetty Channels Widening Project. While EPA is a member of the DMMP Workgroup, EPA is not advocating expansion of the waterway. Although EPA is responsible for designating ocean dumping sites according to Section 102 of the Marine Protection, Research, and Sanctuaries Act, and such sites may be necessary for construction and maintenance of the proposed widening project, USACE may, with concurrence of EPA, select an alternative site in accordance with MPRSA 103(b), when use of an EPA-designated site is not feasible..

Site designation by EPA does not authorize any dredging project nor does it permit disposal of any dredged material. Sites are designated in areas where a need for ocean disposal has been indicated, based on past dredging demands and/or projected demands associated with new or expanded projects. However, site designation does not in and of itself preclude the consideration of other placement options, including beneficial use options or the no action alternative. Once designated as an approved ocean disposal site, the appropriateness of ocean disposal is determined on a case-by-case basis in accordance with the ocean dumping criteria.

The existing designated maintenance material ODMDS is bounded by:

28° 54′ 00″ N, 95° 15′ 49″ W; 28° 53′ 28″ N, 95° 15′ 16″ W;

28° 52′ 00″ N, 95° 16′ 59″ W; 28° 52′ 32″ N, 95° 17′ 32″ W.

Water depth ranges from 31 to 38 ft and the site is 3 miles from shore at its closest point (see Figure C.1-1). The area of the site equals 3.50 square statute miles.

The existing one-time-designated virgin (or construction) material ODMDS, designated for the construction material from the 45-ft project in 1990, is bounded by:

28° 50′ 51″ N, 95° 13′ 54″ W; 28° 51′ 44″ N, 95° 14′ 49″ W;

28° 50′ 15″ N, 95° 16′ 40″ W; 28° 49′ 22″ N, 95° 15′ 45″ W.

Water depth ranges from 54 to 63 ft and the site is 6 miles from shore at its closest point (see Figure C.1-1). The area of the site equals 2.02 square statute miles.

1.2.1 ODMDS Designation Purpose and Need

EPA's action for which this document was prepared is the redesignation of a site for the ocean placement of new work (construction) material to be dredged from widening the Freeport Harbor Entrance and Jetty Channels, and to approve placement of future maintenance material from the widening in the existing maintenance material ODMDS for the Freeport Harbor Channel. A Final Environmental Impact Statement (FEIS) for the new construction and maintenance dredging of the Freeport Harbor Channel (for the authorized 45-ft project), was prepared by the EPA (1990). The maintenance material ODMDS was designated by EPA for the continued placement of dredged material removed from the Freeport Harbor Ship Channel and the ODMDS for construction material was designated for one-time use. The purpose of EPA's action is to redesignate, based on 40 CFR 228, the new work ODMDS, which will provide an environmentally acceptable and economically and physically feasible area for the placement of the construction material from the Freeport Harbor Entrance and Jetty Channels and to approve the placement of future maintenance material from the widening of the Entrance and Jetty Channels for the Freeport Harbor Channel Widening Project in the existing designated maintenance material ODMDS.

1.2.2 ODMDS Designation Alternatives

In EPA (1990) a suite of alternatives was examined for the location of the virgin material ODMDS and the maintenance material ODMDS. These included the No-Action alternative, upland placement, and offshore. The offshore alternatives included mid-shelf, continental slope, and nearshore, including the interim-designated, historically used site. The alternative analysis concluded that only the nearshore alternative was feasible, and the most appropriate sites were selected by eliminating unfeasible areas. The one-time-use virgin material ODMDS and the maintenance material ODMDS resulted from the selection process and were designated. The need to identify and evaluate new nearshore alternative sites was obviated by the fact that the previous ODMDS designation analyses (EPA, 1990) are still deemed to be valid and thorough.

2.0 PROPOSED USE OF THE ODMDSs

Predominantly southward longshore transport has caused shoaling of the existing channel at a rate of approximately 1.98 mcy at approximately 10-month intervals or 2.3 mcy/year. It is anticipated that the channel widening will not impact this number. The proposed use of the existing maintenance material ODMDS is for future maintenance material. The existing site was sized based on a 2.1-mcy discharge

(EPA, 1990), and therefore should be of sufficient size to contain 1.98-mcy/dredging cycle. However, as discussed below, modeling was conducted to ensure that it is large enough.

The existing virgin material ODMDS was designated for one-time use for the 45-ft project (EPA, 1990), based on an anticipated 5.1 mcy of construction material. It is proposed that this site be redesignated for the placement of an additional 2.9 mcy of construction material from this channel widening project. As in the previous designation (EPA, 1990), this designation would be for a one-time use.

3.0 CHARACTERIZATION OF THE ODMDSs

Based on information provided by the USACE, Table C.3-1 provides dredging dates and volumes dredged from the Freeport Harbor Entrance and Jetty Channels from 1951 through 2004. However, only the dredging history in the period since deepening to 45-ft, 1992 through 2004, is included in the frequency and volume calculation. For that period, the average time between the beginnings of each dredging operation is approximately 10.4 months, and the average amount of maintenance material dredged is approximately 1.98 mcy. This does not mean that all of the Entrance and Jetty Channels are dredged every 10.4 months, on average, but it does indicate the average frequency of use of the maintenance material ODMDS.

Chemical data have been collected on ODMDS sediments from the maintenance material ODMDS at interval since 1974. Additionally, a study was conducted by Battelle (2004) for the EPA in 2003. The USACE and EPA data are presented in Tables C.3-2 and C.3-3, respectively. The data in Table C.3-2 are discussed in Section 3.9 of the EIS to which this document is attached and indicate no cause for concern. The range of concentrations is similar for the USACE and the Battelle data. Relative to the data in Table C.3-3, Battelle (2004) states:

> There were no elevated concentrations of metals in sediments from the active discharge quadrants (Q1 and Q2), the inactive quadrants (Q3 and Q4), the Down Current site or the Reference site. No measurements exceeded ER-L guidelines (Long et al., 1995) and all concentrations were similar to those reported for the earth's crust, indicating only natural input (Krauskopf, 1967).

The Battelle Sampling Plan included two stations in the actual disposal area of the maintenance material ODMDS (see Figure C.1-1), two in the downcurrent area of the ODMDS (where placement does not occur), a station located 1,000 ft downcurrent of the ODMDS, and a reference station (see Reference Site, Figure C.1-1). Alls stations were a composite of samples collected at three substations. It should be noted that sediment had recently been placed in the ODMDS and so there was some mounding in the actual disposal area, but none in the nonplacement areas of the ODMDS. Battelle calculated that enough maintenance material had been placed in the site since it was designated to create a mound 33.4 ft high, had it remained in place. However, because it is a dispersive site, only mounding of 2 to 4 ft in the

Table C.3-1
Dredging History

Start	Finish	Dredge Work Type	Prescribed Yards	Over-Depth Yards	Total Yards
Nov-51	Nov-51	Maintenance	474,788	0	474,788
Oct-71	Dec-71	Maintenance	796,500	160,585	957,085
Nov-70	May-71	Maintenance	1,614,436	0	1,614,436
Oct-71	May-72	Maintenance	1,161,215	0	1,161,215
Nov-72	May-73	Maintenance	868,540	0	868,540
Sep-73	Jan-74	Maintenance	1,089,540	0	1,089,540
Dec-73	Jan-74	Maintenance	743,610	0	743,610
Nov-74	Dec-74	Maintenance	1,010,361	0	1,010,361
Sep-75	Dec-75	Maintenance	2,095,572	0	2,095,572
Aug-78	Oct-78	Maintenance	966,648	0	966,648
Aug-80	Jan-81	Maintenance	1,098,920	0	1,098,920
Jun-82	Aug-82	Maintenance	1,388,226	0	1,388,226
Jun-83	Oct-83	Maintenance	1,109,789	0	1,109,789
Oct-84	Nov-84	Maintenance	976,249	209,886	1,186,135
Oct-84	Nov-84	Maintenance	212,799	0	212,799
Jul-86	Aug-86	Maintenance	761,384	164,325	925,709
May-87	Jul-87	Maintenance	1,048,569	193,336	1,241,905
Sep-87	Sep-87	Maintenance	213,773	0	213,773
Aug-88	Sep-88	Maintenance	676,132	167,808	843,940
Aug-89	Sep-89	Maintenance	999,961	0	999,961
Aug-92	Nov-92	Maintenance	2,262,716	621,816	2,884,532
Jul-93	Sep-93	Maintenance	1,415,742	0	1,415,742

Table C.3-1 (Concluded)

Start	Finish	Dredge Work Type	Prescribed Yards	Over-Depth Yards	Total Yards
Aug-94	Nov-94	Maintenance	2,599,267	0	2,599,267
Sep-95	Jan-96	Maintenance	2,081,837	592,189	2,674,026
Jul-96	Aug-96	Maintenance	579,500	0	579,500
Jan-97	Apr-97	Maintenance	1,886,633	602,475	2,489,108
Nov-97	Dec-97	Maintenance	703,453	349,704	1,053,157
Oct-98	Dec-98	Maintenance	1,860,017	474,419	2,334,436
Sep-99	Jan-00	Maintenance	1,093,696	461,919	1,555,615
Jul-00	Nov-00	Maintenance	1,241,830	618,017	1,859,847
Oct-00	Jan-01	Maintenance	2,202,288	0	2,202,288
Jun-01	Sep-01	Maintenance	1,956,384	522,865	2,479,249
May-02	Aug-02	Maintenance	1,996,354	0	1,996,354
Aug-03	Oct-03	Maintenance	1,726,186	0	1,726,186
Sep-04	Nov-04	Maintenance	1,249,655	659,176	1,908,831

TOTAL					
No. yrs	54	years/cycle	1.54	Total cy	49,961,090
No. dredgings	35	months/cycle	18.5	cy/cycle	1,427,460
				cy/yr	925,205
SINCE 1992					
No. yrs	13	years/cycle	0.87	Total cy	29,758,138
No. dredgings	15	months/cycle	10.4	cy/cycle	1,983,876
				cy/yr	2,289,088

TABLE C.3-2

DETECTED PARAMETERS
FREEPORT HARBOR ENTRANCE CHANNEL ODMDS and REFERENCE STATIONS

						Station:	FH-88-DA1			FH-88-REF1			FH-89-DA1			FH-89-REF1		
						Date:	3/15/1988			3/15/1988			4/7/1989			4/7/1989		
						Channel Station:												
Parameter	Liquid Media Unit	Solid Media Unit	WQC	TWQS	ERL		Water	Elutriate	Sediment	Water	Elutriate	Sediment	Water	Elutriate	Sediment	Water	Elutriate	Sediment
Sand		%							46.8			23.6						56.2
Silt		%							34.7			64.2						40.3
Clay		%							18.5			12.2						3.5
D50		mm							0.07									0.08
Percent Solids		%																
Arsenic	µg/L	mg/kg	69	149	8.2		<2.0		2.27	<2.0	<2.0	3.14	<2.0		<1.0	<2.0	<2.0	<1.0
Barium	µg/L	mg/kg	N/A	N/A	N/A		N/A		N/A	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
Cadmium	µg/L	mg/kg	40	45.4	1.20		4.40		<0.1	2.60	2.70	<0.1	<2.0		<0.1	<2.0	<2.0	<0.1
Chromium	µg/L	mg/kg	1,100	1,090	81.0		<10.0		8.68	<10.0	<10.0	10.11	<10.0		4.60	<10.0	<10.0	3.90
Copper	µg/L	mg/kg	4.8	13.5	34.0		4.0		4.20	<1.0	<1.0	4.79	<1.0		5.90	<1.0	<1.0	2.60
Lead	µg/L	mg/kg	210	133	46.7		<5.0		5.60	<5.0	<5.0	6.38	<5.0		1.20	<5.0	<5.0	<1.0
Mercury	µg/L	mg/kg	1.8	2.1	0.15		<0.20		<0.1	<0.20	<0.2	<0.1	<0.20		<0.1	<0.20	<0.2	<0.1
Nickel	µg/L	mg/kg	74	118	20.9		24.2		7.00	25.6	27.8	9.04	<5.0		7.10	<5.0	<5.0	4.90
Selenium	µg/L	mg/kg	290	564	N/A		<2.0		<1.0	<2.0	<2.0	<1.0	<2.0		<0.5	<2.0	<2.0	<0.5
Silver	µg/L	mg/kg	1.9	2.0	1.00		N/A		N/A	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
Thallium	µg/L	mg/kg	N/A	N/A	N/A		N/A		N/A	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
Zinc	µg/L	mg/kg	90	92.7	150		**98.6**		27.45	39.2	<5.0	30.32	<5.0		14.8	<5.0	<5.0	18.1
TOC	mg/L	%	N/A	N/A	N/A		N/A		N/A	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
Total PCB	µg/L	ug/kg	N/A	N/A	N/A		<0.5		<5.0	<0.5	<0.5	<5.0	<0.5		<5.0	<0.5	<0.5	<5.0
Ammonia	mg/L	mg/kg	Var	N/A	N/A		N/A		N/A	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A

TABLE C.3-2 (Continued)

DETECTED PARAMETERS
FREEPORT HARBOR ENTRANCE CHANNEL ODMDS and REFERENCE STATIONS

						Station:	FH-93-DA1			FH-93-REF1			FH-95-DA1			FH-95-REF1		
						Date:	7/20/1993			7/20/1993			2/2/1995			2/2/1995		
						Channel Station:												
Parameter	Liquid Media Unit	Solid Media Unit	WQC	TWQS	ERL		Water	Elutriate	Sediment	Water	Elutriate	Sediment	Water	Elutriate	Sediment	Water	Elutriate	Sediment
Sand		%							12.7			21.8			5.4			6.0
Silt		%							63.2			46.8			66.4			75.2
Clay		%							24.1			31.4			28.2			18.8
D50		mm							0.02			0.04			0.06			0.06
Percent Solids		%																
Arsenic	µg/L	mg/kg	69	149	8.2		<1.0		<0.10	<1.0	<1.0	<0.10	<1.0		<0.10	<1.0	<1.0	<0.10
Barium	µg/L	mg/kg	N/A	N/A	N/A		N/A		N/A	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
Cadmium	µg/L	mg/kg	40	45.4	1.20		<0.10		1.10	<0.10	<0.10	1.00	14.90		**329.10**	15.30	**42.30**	**145.50**
Chromium	µg/L	mg/kg	1,100	1,090	81.0		<1.0		11.70	<1.0	<1.0	12.00	<1.0		<0.10	<1.0	<1.0	<0.10
Copper	µg/L	mg/kg	4.8	13.5	34.0		<1.0		4.70	<1.0	<1.0	4.60	<1.0		36.04	<1.0	<1.0	27.86
Lead	µg/L	mg/kg	210	133	46.7		<1.0		5.10	<1.0	<1.0	4.70	<1.0		15.38	<1.0	<1.0	16.04
Mercury	µg/L	mg/kg	1.8	2.1	0.15		<0.20		<0.02	<0.20	<0.2	<0.02	<0.20		**15.40**	<0.20	<0.2	**8.95**
Nickel	µg/L	mg/kg	74	118	20.9		<1.0		16.30	5.2	<1.0	8.10	<1.0		<0.10	<1.0	<1.0	<0.10
Selenium	µg/L	mg/kg	290	564	N/A		<2.0		<0.20	<2.0	<2.0	<0.20	<2.0		23.07	<2.0	<2.0	20.16
Silver	µg/L	mg/kg	1.9	2.0	1.00		N/A		N/A	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
Thallium	µg/L	mg/kg	N/A	N/A	N/A		N/A		N/A	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
Zinc	µg/L	mg/kg	90	92.7	150		<1.0		30.4	<1.0	52.3	29.7	<1.0		<0.10	<1.0	<1.0	<0.10
TOC	mg/L	%	N/A	N/A	N/A		N/A		N/A	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
Total PCB	µg/L	ug/kg	N/A	N/A	N/A		<0.5		<50.0	<0.5	<0.5	<50.0	<0.5		88.51	<0.5	<0.5	67.62
Ammonia	mg/L	mg/kg	Var	N/A	N/A		N/A		N/A	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A

TABLE C.3-2 (Continued)

DETECTED PARAMETERS
FREEPORT HARBOR ENTRANCE CHANNEL ODMDS and REFERENCE STATIONS

						Station:	FH-97-PA1A		FH-97-REF1			FH-97A-PA1A			FH-97A-REF1		
						Date:	1/25/1997		1/25/1997			9/30/1997			9/30/1997		
						Channel Station:											
Parameter	Liquid Media Unit	Solid Media Unit	WQC	TWQS	ERL		Water	Elutriate	Sediment	Water	Elutriate	Sediment	Water	Elutriate	Sediment	Water	Elutriate	Sediment
Sand		%							18.1			18.7			6.7			8.8
Silt		%							24.7			33.2			48.8			38.5
Clay		%							57.2			48.1			44.5			52.7
D50		mm							0.00			0.01			0.01			0.00
Percent Solids		%																
Arsenic	µg/L	mg/kg	69	149	8.2		<1.0		<0.10	<1.0	<1.0	<0.10	<1.0	8.0	2.96	<1.0	8.0	3.66
Barium	µg/L	mg/kg	N/A	N/A	N/A		25.7		110.0	25.1	17.4	217.0	24.7	56.0	231.0	17.6	28.0	208.0
Cadmium	µg/L	mg/kg	40	45.4	1.20		<0.1		<0.10	<0.1	<0.1	<0.10	<0.1	<0.1	<0.10	<0.1	<0.1	<0.10
Chromium	µg/L	mg/kg	1,100	1,090	81.0		<1.0		33.9	<1.0	<1.0	22.1	<1.0	<1.0	16.1	<1.0	<1.0	22.9
Copper	µg/L	mg/kg	4.8	13.5	34.0		<1.00		19.3	1.80	4.36	13.6	<1.00	<1.00	9.77	<1.00	<1.00	11.3
Lead	µg/L	mg/kg	210	133	46.7		<1.0		45.0	<1.0	<1.0	25.3	1.07	<1.0	3.26	<1.0	<1.0	3.23
Mercury	µg/L	mg/kg	1.8	2.1	0.15		<0.20		<0.02	<0.20	<0.2	<0.02		<0.20	0.02		<0.20	0.02
Nickel	µg/L	mg/kg	74	118	20.9		<1.0		**23.1**	<1.0	<1.0	18.9	<1.0	1.0	15.6	<1.0	1.0	18.9
Selenium	µg/L	mg/kg	290	564	N/A		<2.0		<0.20	<2.0	<2.0	<0.20	<1.0	<1.0	<0.20	<1.0	<1.0	<0.20
Silver	µg/L	mg/kg	1.9	2.0	1.00		<1.0		<0.10	<1.0	<1.0	<0.10	<1.0	<1.0	<0.10	<1.0	<1.0	<0.10
Thallium	µg/L	mg/kg	N/A	N/A	N/A		N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Zinc	µg/L	mg/kg	90	92.7	150		<1.0		62.4	<1.0	4.3	52.3	<1.0	10.3	55.4	6.1	14.4	70.0
TOC	mg/L	%	N/A	N/A	N/A		N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total PCB	µg/L	ug/kg	N/A	N/A	N/A		<0.01		<1.0	<0.01	<0.01	<1.0	<0.01	<0.01	<1.00	<0.01	<0.01	<1.00
Ammonia	mg/L	mg/kg	Var	N/A	N/A		<0.03		6.58	<0.03	0.64	6.74	<0.03	<0.03	4.10	<0.03	<0.03	3.84

TABLE C.3-2 (Continued)

DETECTED PARAMETERS
FREEPORT HARBOR ENTRANCE CHANNEL ODMDS and REFERENCE STATIONS

						Station:	FH-98-PA1A			FH-98-REF1			FH-OB-00-PA1A			FH-OB-00-REF1		
						Date:	9/30/1997			9/30/1997			5/23/2000			5/23/2000		
						Channel Station:												
Parameter	Liquid Media Unit	Solid Media Unit	WQC	TWQS	ERL		Water	Elutriate	Sediment	Water	Elutriate	Sediment	Water	Elutriate	Sediment	Water	Elutriate	Sediment
Sand		%							1.6			21.9			28.2			6.1
Silt		%							44.3			41.0			41.6			33.4
Clay		%							54.1			37.1			30.2			60.5
D50		mm							0.00			0.02			0.05			0.00
Percent Solids		%																
Arsenic	µg/L	mg/kg	69	149	8.2		<1.00		5.77	<1.00	<1.00	3.94	<1.00		3.43	<1.00	<1.00	4.92
Barium	µg/L	mg/kg	N/A	N/A	N/A		23.7		151	22.2	57.9	122	31.7		76.0	26.2	47.5	81.2
Cadmium	µg/L	mg/kg	40	45.4	1.20		0.17		0.14	<0.10	<0.10	<0.10	0.60		<0.10	0.90	0.40	0.10
Chromium	µg/L	mg/kg	1,100	1,090	81.0		<1.0		17.9	<1.0	<1.0	13.5	<1.00		6.00	<1.00	<1.00	8.91
Copper	µg/L	mg/kg	4.8	13.5	34.0		<1.00		12.10	<1.00	<1.00	9.83	<1.00		7.53	<1.00	<1.00	9.34
Lead	µg/L	mg/kg	210	133	46.7		<1.0		4.58	<1.0	<1.0	3.41	<1.00		11.1	<1.00	<1.00	16.1
Mercury	µg/L	mg/kg	1.8	2.1	0.15		<0.20		0.02	<0.20	<0.20	0.05	<0.20		0.04	<0.20	<0.20	0.04
Nickel	µg/L	mg/kg	74	118	20.9		<1.00		15.4	<1.00	<1.00	12.1	4.00		8.04	<1.00	<1.00	12.50
Selenium	µg/L	mg/kg	290	564	N/A		<1.00		<0.20	<1.00	<1.00	<0.20	<1.00		0.20	<1.00	<1.00	0.27
Silver	µg/L	mg/kg	1.9	2.0	1.00		<1.0		0.23	<1.0	<1.0	<0.10	<1.00		<0.10	<1.00	<1.00	<0.10
Thallium	µg/L	mg/kg	N/A	N/A	N/A		N/A		N/A	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
Zinc	µg/L	mg/kg	90	92.7	150		20.5		51.8	10.6	1.1	44.2	10.7		31.2	47.1	5.2	34.3
TOC	mg/L	%	N/A	N/A	N/A		<1.00		7350	<1.00	<1.00	6880	<1.0		10100	<1.0	<1.0	15500
Total PCB	µg/L	ug/kg	N/A	N/A	N/A		<0.01		<1.00	<0.01	<0.01	<1.00	<0.01		<1.00	<0.01	<0.01	<1.00
Ammonia	mg/L	mg/kg	Var	N/A	N/A		<0.03		11.8	<0.03	5.70	5.70	<0.03		29.0	<0.03	0.36	3.05

TABLE C.3-2 (Concluded)

DETECTED PARAMETERS
FREEPORT HARBOR ENTRANCE CHANNEL ODMDS and REFERENCE STATIONS

						Station:	FH-EC-04-REF			FH-EC-05-REF		
						Date:	4/29/2004			6/29/2005		
						Channel Station:						
Parameter	Liquid Media Unit	Solid Media Unit	WQC	TWQS	ERL	Water	Elutriate	Sediment	Water	Elutriate	Sediment
Sand		%						12.9			7.5
Silt		%						28.2			5.7
Clay		%						58.9			86.8
D50		mm						0.00			0.00
Percent Solids		%						47.2			47.4
Arsenic	µg/L	mg/kg	69	149	8.2			6.93			7.53
Barium	µg/L	mg/kg	N/A	N/A	N/A			N/A			N/A
Cadmium	µg/L	mg/kg	40	45.4	1.20			0.13			0.2
Chromium	µg/L	mg/kg	1,100	1,090	81.0			19.6			23.8
Copper	µg/L	mg/kg	4.8	13.5	34.0			12.2			15.4
Lead	µg/L	mg/kg	210	133	46.7			17.6			16.8
Mercury	µg/L	mg/kg	1.8	2.1	0.15			<0.20			<0.20
Nickel	µg/L	mg/kg	74	118	20.9			18.8			20.8
Selenium	µg/L	mg/kg	290	564	N/A			<0.50			<0.50
Silver	µg/L	mg/kg	1.9	2.0	1.00			<0.20			<0.20
Thallium	µg/L	mg/kg	N/A	N/A	N/A			0.21			0.38
Zinc	µg/L	mg/kg	90	92.7	150			25.4			17.9
TOC	mg/L	%	N/A	N/A	N/A			10300			13300
Total PCB	µg/L	ug/kg	N/A	N/A	N/A			N/A			N/A
Ammonia	mg/L	mg/kg	1.7	N/A	N/A			71.0			12.2

Chromium = CrIII and Total Cr
Var = varies based on pH, salinity, and temperatures
N/A means that no analyses were conducted for a particular parameter in a particular year
WQC = EPA Acute, Marine Water Quality Criterion; TWQS = Texas Acute, Marine Water Quality Standard; ERL = Effects Range Low

Table C.3-3*
Metal Concentrations in Sediments (mg/kg dry weight).

Metal	Site						ER-L [1]	Earth Crust [2]
	Q1	Q2	Q3	Q4	DC	Reference		
Antimony	0.025	0.025	0.025	0.025	0.025	0.06	-	0.2
Arsenic	5.1	5.1	5.4	3.8	4	5.3	8.2	1.8
Beryllium	0.83	0.84	0.54	0.54	0.59	0.97	-	2.8
Cadmium	0.064	0.083	0.039	0.046	0.043	0.116	1.2	0.2
Chromium	20.7	16.1	11.8	10.6	11.7	16.4	81	100
Copper	8.65	10	5.68	6.17	6.66	13.5	34	55
Lead	14.2	14.4	10.2	9.79	11	14.1	46.7	12.5
Mercury	0.03	0.03	0.02	0.02	0.02	0.02	0.15	0.08
Nickel	16.1	16.5	11.7	11.4	12.3	19.7	20.9	75
Selenium	0.4	0.4	0.5	0.4	0.4	0.6	-	0.05
Silver	0.04	0.05	0.03	0.03	0.03	0.04	1	0.07
Zinc	54.3	50.4	41.8	39.6	43.3	45.5	150	70

[1] = Long et al. 1995

[2] = Krauskopf 1967

* *Ver batim* from Battelle (2004)

northeastern third of the ODMDS, probably from the recently placed material, was observed. Battelle (2004) also found that the majority of benthic macroinfaunal indicators were negatively correlated to percent fines, which could lead to a short-term impact on the infauna since maintenance material averaged 8.9% (EIS Table 3.9-2) sand versus 24.9% and 17.3% average sand for the ODMDS and Reference site, respectively, based on the data in Tables C.3-2 and C.3-3.

Conversely, USACE studies (Espey, Huston & Associates, Inc. [EH&A], 1991, 1993a, 1993b, 1994) demonstrated that impacts from construction material placement at the virgin material ODMDS were not detected 6 months after cessation of dredging. Sand content near the ODMDS averaged 11% during the predredging survey in 1990 versus 38% for the reference sediment. Six months after placement, the sand content increased to 48% near the ODMDS versus 54.6% at the reference site. In the preconstruction benthic invertebrates survey, only one of the eight monitoring stations surrounding the ODMDS had a greater number of taxa than the reference station. Six months after construction, only one station had fewer. Similar results were found for total number of individuals and mean density. By 18 months after construction, the sand content at the reference site was generally higher than at the monitoring stations surrounding the ODMDS, and benthic metrics were also higher, confirming the results found by Battelle (2004).

4.0 CHARACTERIZATION OF THE MATERIAL EXPECTED TO BE DREDGED

4.1 VIRGIN MATERIAL

Throughout this document, it is assumed that information relative to the construction material dredged for the 45-ft project and presented in EPA (1990) is valid for the proposed widening, since the widening project is an expansion of the 45-ft project and will also be dredged to 45 ft. The data included in EPA (1990) and EPA (1989) are included in this document by reference. However, the standards and criteria to which the sample concentrations are compared have changed since the construction material ODMDS was designated in 1990. Therefore, where pertinent, the data from EPA (1989) will be discussed. Additionally, chemical analyses were conducted on material from core samples taken in the area to be included in the widening (Fugro, 2005; PBS&J, 2005). Those data are included in Table C.4-1.

There were six exceedances of effects range low (ERLs) in the Fugro (2005) data (Table C.4-1), all by nickel, with an ERZ of 20.9 mg/kg. The exceedance values ranged from 23.8 milligram per kilogram (mg/kg) (114% of the ERL) to 35.3 mg/kg (170% of the ERL), but no toxicity was exhibited by sensitive water column or benthic organisms, during bioassays conducted the sediments according to procedures provided in EPA/USACE (1991). The results of the bioassays and several other factors lead to the conclusion that the nickel ERL exceedances do not lead to a cause for concern. The other factors are (1) there is no way to determine if nickel was the causative factor in the data that led to the nickel ERL (see Project EIS Section 3.9.3.1); (2) toxicity data have demonstrated that nickel concentrations in the same

TABLE C.4-1

CONCENTRATIONS OF DETECTED CONSTITUENTS IN SOILS (dry weight)
FREEPORT WIDENING PROJECT

Date Sampled: February 2005

Parameter	Units	NOAA ERL*	B-1,E,26' 0211038	B-2,E-1,24' 0211039	B-2,E-2,46' 0211040	B-3,E-1,26' 0211041	B-3,E-2,35' 0211042	B-4,E-1,35' 0211043	B-4,E-2,40' 0211044	B-5,E-1,34' 0211045	B-5,E-2,59' 0211046	B-6,E-2,32-34' 0211047
Antimony	mg/kg	N/A	< 0.0986	< 0.0934	< 0.0971	< 0.0948	< 0.0977	< 0.0977	< 0.0971	< 0.0878	< 0.0910	< 0.0966
Arsenic	mg/kg	8.2	2.7	2.4	1.4	0.700	8.2	2.0	4.1	0.600	2.0	1.6
Beryllium	mg/kg	N/A	1.15	1.18	1.46	0.274	1.46	0.743	1.16	0.142	0.983	0.433
Chromium, Total	mg/kg	81.0	28.1	46.0	59.9	7.8	46.8	15.3	23.2	4.1	20.2	9.9
Copper	mg/kg	34.0	25.8	19.1	19.9	3.6	26.1	10.1	19.5	1.6	12.2	4.6
Lead	mg/kg	46.7	14.9	27.6	29.9	5.1	39.9	7.0	15.6	2.8	10.7	6.8
Manganese	mg/kg	N/A	257.7	184.7	214.1	130.2	723.2	157.2	489.6	85.2	290.1	311.9
Mercury	mg/kg	0.150	< 0.00794	< 0.00664	< 0.00663	< 0.00613	< 0.00647	< 0.00597	< 0.00647	< 0.00602	0.0111	0.0129
Nickel	mg/kg	20.9	**30.2**	**26.8**	**33.3**	6.0	**35.3**	17.6	**29.8**	3.3	**23.8**	10.6
Thallium	mg/kg	N/A	0.294	0.284	0.340	< 0.190	0.324	< 0.195	0.285	< 0.176	0.214	< 0.193
Zinc	mg/kg	150	61.7	63.1	73.5	38.0	64.5	34.8	58.9	10.5	50.4	40.6
Fluoranthene	ug/kg	600	< 635	< 531	< 265	534	< 259	< 239	< 259	< 241	< 237	< 259
Percent Solids	%	N/A	63.0	75.3	75.4	81.5	77.3	83.8	77.3	83.0	84.5	77.1

ERL = Effects Range Low for Marine Sediments. There are no ERLs for soils.

range as those found in these samples did not cause toxicity; (3) the concentrations are less than a factor of two of the ERL; (4) the concentrations are below the Effects Range Medium (ERM) concentration (51.6 mg/kg) and well below the Apparent Effects Threshold values, of which 110.0 mg/kg (for echinoderm larvae) is the lowest value (Buchman, 1999); and (5) there are no Action Levels established by the Food and Drug Administration for poisonous or deleterious substances in human food and animal feed (which includes fish and shellfish) for nickel. Based on this information and the fact that no other ERLs were exceeded, there would appear to be no cause for concern relative to placing these soils in the Gulf of Mexico.

A reexamination of the data presented in EPA (1989) determined that the concentration of no parameter in the elutriates exceeded the EPA Water Quality Criteria (WQC, Table C.4-2), except perhaps copper in 1976, and nickel in one boring station (Station 12, 0–6 ft) of 19 in 1974. The concentration of copper (<10 µg/l) may exceed the WQC, but since the detection limit (10 µg/l) was higher than the Criterion, this cannot be determined. However, the WQC for copper has been raised from 2.9 µg/l to 4.8 µg/l, so the likelihood of an exceedance is no greater than when the virgin material ODMDS was designated.

4.2 MAINTENANCE MATERIAL

As noted above, the characteristics of the maintenance material are discussed in Section 3.9 of the EIS to which this document is appended and will not be repeated here.

5.0 MODELING OF DREDGED MATERIAL DISTRIBUTION

The placement of dredged material was simulated using an updated version (MDFATE; USACE/EPA, 1991) of a 1976 model, Dredged Material Fate (DMF), developed for the USACE through the Dredged Material Research Program by Tetra Tech., Inc. (Brandsma and Divoky, 1976). The modifications to this model were made under the supervision of Dr. Billy H. Johnson of the Waterways Experiment Station of the USACE. The purpose of the modeling was to determine if the previously designated virgin material ODMDS and the existing maintenance material ODMDS were of sufficient size to contain the construction and future maintenance from the Freeport Entrance and jetty Channel Widening Project.

This program models the initial behavior and final disposition of dredged material deposited “instantaneously” at the site of interest through the doors of a hopper dredge. The MDFATE model assumes that this procedure may be broken into three phases: (1) convective descent, during which the discharge cloud falls under the influence of gravity; (2) dynamic collapse, occurring when the descending cloud impacts the bottom or arrives at a level of neutral buoyancy at which point the descent is retarded and horizontal spreading dominates; and (3) long-term passive dispersion, commencing when the material transport and spreading are determined more by ambient currents and turbulence than by the dynamics of the disposal operation (Johnson and Holliday, 1978). The model also includes the settling of suspended solids.

TABLE C.4-2
RANGE OF VALUES FOR ELUTRIATE SAMPLES
WITH CHANNEL VIRGIN SEDIMENT

Parameter	Water* Quality Criteria	1974[a]	1976[a]
Metal (ug/l)			
Arsenic	69	--	0.1 - 4
Cadmium	40	<1	2 - 3
Chromium	1,100	--	10 - 20
Copper	4.8	--	10
Lead	210	--	10 - 20
Mercury	1.8	--	0.36 - 0.73
Nickel	74	40 - 130	10 - 20
Selenium	290	--	0.1 - 1.9
Zinc	90	--	10 - 20

*EPA (2002).
[a] USACE (1978).

The model was run for the size of hopper dredge that is anticipated to be used in the Project, a 3,600-cy hopper dredge (19.5-ft loaded draft, 9.5-ft light draft, 27-inch suction pipe, 11 knots loaded, 12 knots light, 4 knots during discharge, 4 minutes to empty hoppers). Model runs were made for both the previously designated virgin material ODMDS and the existing maintenance material ODMDS. Based on EPA (1989), it was anticipated that a 0.5 knot surface current and a 0.25 bottom current would be used in the modeling. However, the model will not accept but one current velocity, so a 0.38 knot current, parallel to the long axis of the ODMDSs was entered into the model.

5.1 VIRGIN MATERIAL

The percentage of the various soil particle types anticipated in the virgin sediment to be dredged was estimated using the information from EPA (1989) and confirmed by Fugro (2005) to be 2.5% shell, 4.5% sand, 21.0% silt, and 72% clay (as clayballs).

Output from the MDFATE model simulates the results of depositing the entire amount of dredged material on the ocean floor at predetermined grid points. In the models, the mounds of virgin material were slightly skewed in the current and vessel-heading directions and would form rounded diamond-shapes, slightly elongated in the down-current and vessel-travel directions, although this is difficult to see at the scale of the figures in Attachment A. At its thickest, the mound elevation for the largest mound of virgin material in the ODMDSs would be 3 to 4 ft. Based on preliminary model runs using the placement scheme included in EPA (1989), mound height at the edges of the ODMDS was not zero at all points. Therefore, the placement scheme was revised to eliminate some of the outer placement points in order to ensure that the material remained in ODMDS. As can be seen from Attachment A, after adjustment of the placement scheme, the lateral extent from the peak of the mounds at the edge of the mounding to the point where the model indicates mound thickness is reduced such that ambient water depth is reached remains totally within the boundaries of the ODMDS. Therefore, as an examination of Attachment A will reveal, the size of the construction material ODMDS is more than sufficient to contain the virgin material from the proposed channel widening.

5.2 MAINTENANCE MATERIAL

The MDFATE model program was also run on the maintenance material using a 3,600-cy hopper dredge. The percentage of the grain sizes anticipated in the maintenance material to be dredged from the widened Entrance and Jetty Channels was based on the grain size of past maintenance material, using historical information from analyses of maintenance material from the existing channel dating from 1988 through 2005 (USACE Galveston District Dredging Histories Data Base). The MDFATE model runs for future maintenance dredged material placement utilized the historic maintenance material grain size data as input. Again, the placement scheme from EPA (1989) had to be revised by reducing the first row of placement points along the edges of the long axes and adding more interior placement points in the down-current direction and the model rerun (Attachment A). As a result of that analysis, it was found that the mound elevation for the largest mound of maintenance material in the ODMDSs would be 5 to 6 ft.

Therefore, the size of the existing maintenance material ODMDSs was more than sufficient for future routine maintenance from the Widening Project (Attachment A).

6.0 ENVIRONMENTAL CONSEQUENCES

As required by the Ocean Dumping Regulations (40 CFR 220–229) promulgated to interpret the Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA), the previously designated construction material ODMDS will be examined relative to the five general criteria and the eleven specific factors (40 CFR 228.5 and 40 CFR 228.6(a), respectively). Since the maintenance material to be dredged from the proposed widened channel should be the same as existing maintenance material, except for volume, the existing routine maintenance material ODMDS will be examined to determine if it is of sufficient size to receive the greater quantity of material. This information will be included in the examination relative to the 5 general criteria and the 11 specific factors, where pertinent. In the following section, the criteria and factors are presented in italics, followed by the statement indicating compliance.

Other environmental regulations, which are pertinent to ODMDS designation, are addressed in the Project EIS to which this ODMDS analysis is attached: Coastal Zone Management (Project EIS Section 6.0 and Appendix H), Endangered Species Act (Project EIS Section 4.15 and Appendix G), Magnuson-Stevens Fishery Conservation and Management Act or Essential Fish Habitat (Project EIS Sections 3.14.2 and 4.14 and Appendix E), cultural and historic resources (Project EIS Section 4.16), and Section 4.1 Water Quality Certification (Project EIS Section 6.0).

6.1 REGULATORY CHARACTERIZATION

6.1.1 Five General Criteria

6.1.1.1 40 CFR 228.5(a)

The dumping of materials into the ocean will be permitted only at sites or in areas selected to minimize the interference of disposal activities with other activities in the marine environment, particularly avoiding areas of existing fisheries or shellfisheries, and regions of heavy commercial or recreational navigation.

The construction material ODMDS, like the other nonexcluded areas in EPA (1989), were selected, including appropriate buffer zones, to avoid sport and commercial fishing activities, as well as other areas of biological sensitivity. The excluded areas include a white shrimp breeding area, a sport and commercial fishing harvest area, two reef areas and the jetties, all with buffer zones; platforms; submerged shipwrecks; and several single oil and/or gas platforms. The buffer zones were sized on the basis of the physical movement of the disposal material, since sediment analysis in EPA (1989) and PBS&J (2005) concluded that the quality of the material proposed for discharge met the criteria of 40 CFR 227. The preferred sites are outside the Channel, including the navigation channel buffer zone, and they avoid known navigational obstructions.

6.1.1.2 40 CFR 228.5(b)

Locations and boundaries of disposal sites will be so chosen that temporary perturbations in water quality or other environmental conditions during initial mixing caused by disposal operations anywhere within the site can be expected to be reduced to normal ambient seawater levels or to undetectable contaminant concentrations or effects before reaching any beach, shoreline, marine sanctuary, or known geographically limited fishery or shellfishery.

The results of the analyses and studies (EH&A, 1989, 1991, 1993a, 1993b, 1994; PBS&J, 2005), as discussed above, indicate that the construction material dredged for the 45-ft project was acceptable for ocean disposal under 40 CFR 227. The biota of the area near the ODMDS is healthy (EH&A, 1994). While toxicity tests have not been conducted for the virgin sediments, there is no evidence to suggest that they would not meet the criteria of 40 CFR 227 and chemical analysis at the Freeport Channel, as noted in Section 4.1 of this ODMDS assessment, and experience with other Texas Gulf Coast areas, including the nearby Galveston Harbor Channels, support an expectation that the virgin sediment would be acceptable for ocean disposal. The appropriate sizes for the buffer zones and for the preferred sites are based on the sediment transport information and the physical oceanographic characterization of the Freeport area. These, combined with the information on the expected quality of the material to be dredged, as discussed above, and recent modeling with MDFATE, ensure that perturbations caused by disposal would be reduced to ambient conditions at the boundaries of the new work ODMDS.

6.1.1.3 40 CFR 228.5(c)

If at any time during or after disposal site evaluation studies, it is determined that existing disposal sites presently approved on an interim basis for ocean dumping do not meet the criteria for site selection set forth in 228.5–228.6, the use of such sites will be terminated as soon as suitable alternative disposal sites can be designated.

Although included in the General Criteria, this item is not really a criterion for site designation, and, in fact, information presented in EPA (1990) was designed to answer the question raised by 40 CFR 228.5 (c). A suitable alternative to the interim site was designated and extensive monitoring and surveillance programs, including bathymetric scans; water, sediment and elutriate chemistry; bioassays; bioaccumulation studies; and benthic infaunal analyses (EH&A, 1991, 1993a, 1993b, 1994), do not indicate that any problems are apparent at the construction material ODMDS.

6.1.1.4 40 CFR 228.5(d)

The sizes of ocean disposal sites will be limited in order to localize for identification and control any immediate adverse impacts and to permit the implementation of effective monitoring and surveillance programs to prevent adverse long-range impacts. The size, configuration, and location of any disposal site will be determined as a part of the disposal site evaluation or designation study.

The size of the construction material ODMDS was as small as possible to meet reasonably the criteria stated at 40 CFR 228.5 and 228.6(a) for the 45-ft project. The determined size for the virgin material site is 3.49 square statute miles (2.64 square nautical miles) while that for the future maintenance material site is 2.02 square statute miles (1.53 square nautical miles) versus 0.53 square statute miles for the interim-designated site. The monitoring program included in EPA (1989) determined no adverse long-range impacts. Modeling with MDFATE was conducted to determine if the size of the ODMDS was sufficient for the proposed channel widening project. The size of the site was not reduced for the widening project, even though the projections indicate less material will be dredged for the widening project than was dredged for the 45-ft project because the area has been designated in the past.

6.1.1.5 40 CFR 228.5(e)

EPA will, wherever feasible, designate ocean dumping sites beyond the edge of the continental shelf and other such sites that have been historically used.

It was determined in EPA (1989) that cost, safety and time factors, plus difficulties with monitoring and surveillance, dictated that the distance to the edge of the continental shelf at Freeport precluded the use of any ODMDS off the shelf. Additionally, the lack of resilience of the deep-ocean benthic community and the grain size disparity between the material to be discharged and the deep-ocean sediments off Freeport indicated that an off-shelf disposal site would cause severe impacts to the off-shelf benthic community. No advantage to an off-shelf site was noted. The virgin material ODMDS has been historically-used for the 45-ft project.

6.1.2 Eleven Specific Factors

40 CFR 228.6(a) states that the factors included below as Sections 6.1.3.1 through 6.1.3.11 will be considered in the selection process for site designation.

6.1.2.1 40 CFR 228.6(a)(1)

Geographical position, depth of water, bottom topography, and distance from coast.

The preferred site for the virgin material disposal, as determined in EPA (1990), is bounded by the following coordinates (see Figure C.1-1):

28° 50′ 51″ N, 95° 13′ 54″ W; 28° 51′ 44″ N, 95° 14′ 49″ W;

28° 50′ 15″ N, 95° 16′ 40″ W; 28° 49′ 22″ N, 95° 15′ 45″ W.

The water depth at the preferred site ranges from 54 to 63 ft (see Figure C.1-1), the bottom topography is flat and the preferred virgin material ODMDS is approximately 6 miles from the coast at its closest point.

6.1.2.2 40 CFR 228.6 (a)(2)

Location in relation to breeding, spawning, nursery, feeding or passage areas of living resources in adult or juvenile phases.

EPA (1989) reports a white shrimp breeding area, a sport and commercial fishing harvest area, and a reef area, approximately 5 miles southwest of the construction material ODMDS. EPA (1989) also reports a small collection of coral heads (reefs), approximately 5 miles east of the construction material ODMDS, the jetties are approximately 6 miles north northeast. There appear to be no oil and/or gas platforms within 5 miles of the end of the jetties and only 9 within 10 miles of the end of the jetties (NOAA Coast Survey Nautical Chart 11321, 30th Ed., July 2004), and none are in the ODMDS. The *George Vancouver*, a Liberty Ship, which is part of the TPWD artificial reef program, is located about 10.5 miles southwest of Freeport.

6.1.2.3 40 CFR 228.6(a)(3)

Location in relation to beaches or other amenity areas.

The virgin material ODMDS is roughly 6 miles from beaches and at least 3 miles from other amenity areas. These include a white shrimp breeding area, a sport and commercial fishing harvest area, and a reef area at the southwest border of the ZSF a small collection of coral heads (reefs) at the northeast border (EPA, 1990).

6.1.2.4 40 CFR 228.6(a)(4)

Types and quantities of wastes proposed to be disposed of and proposed methods of release, including methods of packaging the waste, if any.

Virgin construction material (2.9 mcy) only will be discharged into the construction material ODMDS. Historically, the construction material ODMDS was designated for the 5.1 mcy of material to be removed in connection with the 45-ft project. Based on chemical analyses of the virgin material, which indicated no problems with the acceptability of these materials for ocean disposal, EPA (1989) concluded that no special location or precautions would be necessary for the disposal of the materials to be dredged except for grain size. The virgin material ODMDS was sited in the silty-clay regime, with which it was most compatible.

6.1.2.5 40 CFR 228.6(a)(5)

Feasibility of surveillance and monitoring.

The construction material ODMDS is amenable to surveillance and monitoring, as is evidenced by EH&A (1991, 1993a, 1993b, 1994).

6.1.2.6 40 CFR 228.6(a)(6)

Dispersal, horizontal transport, and vertical mixing characteristics of the area, including prevailing current velocity, if any.

These physical oceanographic parameters were used (1) to develop the necessary buffer zones for the exclusion analysis, and (2) to determine the minimum size of the preferred site in EPA (1989). Predominant longshore currents, and thus predominant longshore transport is to the southwest. Steady longshore transport and occasional storms, including hurricanes, should remove the placed material from the site. The size of the ODMDSs was modeled using MDFATE, which includes vertical mixing, to ensure that it was large enough to prevent significant mounding (see Section 5.0).

6.1.2.7 40 CFR 228.6(a)(7)

Existence and effects of current and previous discharges and dumping in the area (including cumulative effects).

The information from EH&A (1994) plus chemical analyses of water from the area concluded that there were no indications of water or sediment quality problems near the construction material ODMDS. Studies of the benthos near the ODMDS (EH&A, 1994) did not indicate any significant decrease or change in composition of the benthos at the ODMDS.

6.1.2.8 40 CFR 228.6(a)(8)

Interference with shipping, fishing, recreation, mineral extraction, desalination, fish and shellfish culture, areas of special scientific importance and other legitimate uses of the ocean.

The items from the above list which are pertinent to the Freeport ODMDS are shipping, mineral extraction, commercial and recreational fishing, recreational areas, and historic sites. The location of the ODMDS was selected so that its use would not interfere with other legitimate uses of the ocean (EPA, 1990). Disposal operations in the past have not interfered with other uses.

6.1.2.9 40 CFR 228.6(a)(9)

Existing water quality and ecology of the site as determined by available data or by trend assessment or baseline surveys.

Monitoring studies have shown only short-term water column perturbations of turbidity, and perhaps chemical oxygen demand, which resulted from disposal operations. No short-term sediment quality perturbation could be directly related to disposal operations. In general, the water and sediment quality and benthic macroinvertebrate matrices are good throughout the vicinity of the ODMDS (EPA, 1989; EH&A, 1994). This indicates that there have been no long-term impacts on water and sediment quality or on the benthos at the construction material ODMDS.

6.1.2.10 40 CFR 228.6(a)(10)

Potentiality for the development or recruitment of nuisance species in the disposal site.

With a disturbance to any benthic community, initial recolonization will be by opportunistic species. However, these species are not nuisance species in the sense that they would interfere with other legitimate uses of the ocean or that they are human pathogens. EH&A (1993a, 1993b, 1994) determined that the placement of virgin material in the ODMDS has not, and placement of the proposed material should not, attract or promote the development or recruitment of nuisance species.

6.1.2.11 40 CFR 228.6(a)(11)

Existence of or in close proximity to the site of significant natural or cultural features of historical importance.

The nearest site of historical importance to the virgin material ODMDS is approximately 0.5 mile away from the edge of this site in a cross-current direction (Figure C.6-1 from EPA, 1989). Monitoring has determined no movement of material out of the ODMDS that would impact sites of historical importance.

7.0 SITE MONITORING AND MANAGEMENT PLAN

One of the ODMDS management responsibilities cited in 40 CFR 228.3 is "developing and maintaining effective ambient monitoring programs," although this is tempered somewhat by 40 CFR 228.9 (a), which states, "The monitoring program, if deemed necessary by the Regional Administrator or the District Engineer, as appropriate, may include baseline or trend assessment surveys. . ." Since 40 CFR 229 (c) states that "EPA will require the full participation of permittees . . . in the development and implementation of disposal monitoring programs," a monitoring program and SMMP are included in this EIS.

There are two approaches that may be applied to determining unfavorable trends. One is to conduct monitoring surveys on the ecosystem at and near the ODMDSs at regular intervals. The other approach is to determine the quality of the material to be discharged at the site, from a chemical and biological perspective, and thereby, to determine expected impacts. The testing requirements specified in 40 CFR 227.13, as applied by the USACE, Galveston District, satisfy parts of both of the above-mentioned approaches.

7.1 CONSTRUCTION MATERIAL

While the literature on maintenance material disposal on the Gulf coast indicates only minor short-term and negligible long-term mounding from placement activities, little information is available for virgin material ODMDSs. The USACE conducted monitoring following construction of the 45-ft project, for which the virgin material ODMDS was originally designated. No significant change in water quality,

sediment quality, or benthic community was detected (EH&A, 1993a; Barry A. Vittor & Associates, Inc., 1993, 1994). Mounding from the construction material, while acceptable, is higher and of firmer material than is true for the maintenance material. Additionally, construction placement is expected to last for only a period of two years or less and more frequent monitoring would be expected than would be necessary for the periodic, but short-term placement which occurs with maintenance dredging. The following monitoring and surveillance program is proposed for the Widening Project ODMDS during construction. The monitoring is discussed in detail below.

1. A major consideration in the acceptability of the size of the ODMDS was the location of the dredge when each discharge occurs. To prevent excessive mounding, it is necessary that a method be utilized to record the location of each discharge to ensure that the dredge places material all over the ODMDS while it avoids approaching the edges of the ODMDS too closely. The following is the scheme used in the modeling to avoid excessive mounding and dispersal of material outside the ODMDS: two discharge at all exterior placement points (one should a larger dredge be used), followed by one discharge at each of the interior placement points in a given sequence until each has been utilized. Continue repeating the sequence with one discharge at each interior placement point until construction is complete.
2. Routine bathymetric scans should be conducted for the ODMDS to determine that there is no excessive mounding; e.g., to elevations greater than 5.0 ft above the existing bottom elevation (unless an alternate height is determined in agreement between the EPA and USACE on a case-by-case basis), and that there is no short-term transport of material beyond the limits of the ODMDS. Studies have shown that benthic organisms can burrow through 6–9 inches of dredged material without significant impacts on the community (EPA/USACE, 1996). Therefore, a depth of 1.0 ft of sedimentation along the ODMDS boundary will be considered the threshold level for movement of material outside of the designated ODMDS. A Notice to Mariners will be posted relative to any excessive mounding which does occur.
3. Monitoring stations (EPA, 1989), including a control station, stations located immediately outside the ODMDS, and stations located some distance down-current from the site should be sampled for the items noted in the following paragraph, to determine if impacts are occurring outside of the ODMDS. EPA (1989) describes two stations on each side of the ODMDS, roughly 300 ft from the ODMDS edges (Stations B1 through B8), a control site located west of the ODMDS, and two stations located 10,000 ft down-current (southwest) of the down-current edge of the ODMDS.

These stations should be sampled periodically during construction and for one year after the cessation of discharge of virgin material at the site. Frequency of monitoring will be decided by the EPA, in cooperation with the USACE, prior to construction. Samples should be collected for: (1) grain-size analysis, (2) chemical characterization of sediments, and (3) macrobenthic invertebrates (in triplicate). Since chemical analyses, bioassays, and bioaccumulation studies have already been conducted on the construction material (Section 3.2.4), since the construction material was approved for placement at this site for the 45-ft project, and since dredging and placement are a one-time event for construction, no further testing of the virgin material is required prior to dredging.

7.2 MAINTENANCE MATERIAL

Since use of the maintenance material ODMDS is ongoing, as opposed to a one-time event for the virgin material ODMDS, a draft ODMDS Management Plan has been prepared and is included as Attachment B to this ODMDS assessment.

8.0 REFERENCES CITED

Battelle. 2004. Characterization of Ocean Dredged Material Disposal Site at Freeport, Texas. Final Report. Prepared for Region VI, U.S. EPA. February 2004.

Brandsma, M.G., and D.J. Divoky. 1976. Development of models for prediction of short-term fate of dredged natural discharge in the estuarine environment. U.S. Army Engineer Waterways Experiment Station. Contract Report D-76-5.

Buchman, Michael. 1999. National Oceanic and Atmospheric Administration (NOAA) Screening Quick Reference Tables. HAZMAT Report 99-1.

Espey, Huston & Associates, Inc. (EH&A). 1991. Pre-Disposal Benthic Microinfaunal Analysis of the Freeport Harbor, Virgin Material Ocean Dredged Material Disposal Site Monitoring Stations, June 1990. Prepared for the U.S. Army Corps of Engineers, Galveston District

———. 1993a. First Monitoring Survey of the Freeport Harbor, Virgin Material Ocean Dredged Material Disposal Site Monitoring Stations, February 1993. Prepared for the U.S. Army Corps of Engineers, Galveston District

———. 1993b. Second Monitoring Survey of the Freeport Harbor, Virgin Material Ocean Dredged Material Disposal Site Monitoring Stations, October 1993. Prepared for the U.S. Army Corps of Engineers, Galveston District

———. 1994. Final Monitoring Survey of the Freeport Harbor, Virgin Material Ocean Dredged Material Disposal Site Monitoring Stations, February 1994. Prepared for the U.S. Army Corps of Engineers, Galveston District

Fugro Consultants LP. 2005. Geotechnical Study, Jetty Stability and Channel Widening Project, Freeport Ship Channel, Port of Freeport, Freeport, Texas.

Hackett, B. 2003. National Dredging Needs Study of U.S. Ports and Harbors. Prepared for USACE, Institute for Water Resources – Navigation Division.

Johnson, B.H., and B.W. Holliday. 1978. Evaluation and calibration of the Tetra Tech dredged material disposal models based on field data. Dredged Material Research Program Technical Report D-78-47, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.

Martin Associates. 2006. The Economic Benefits of Widening and Deepening the Federal Port Freeport, Texas Shipping Channel. May 1.

PBS&J. 1999. Freeport Harbor Entrance Channel Contaminant Assessment. Document No. 991028. PBS&J, Austin, Texas. Prepared for U.S. Army Engineer District, Galveston.

———. 2005. Analysis of Chemistry Data of Potential Dredged Material. Letter Report to Shiner Moseley and Associates, Inc. March 2006.

TranSystems Corporation. 2006. Freeport Harbor Improvements Project Vessel Transit Time Delay Analysis. Prepared for Port Freeport, Brazos River Harbor Navigation District.

U.S. Army Corps of Engineers. 2002. Freeport Harbor, Texas, Navigation Improvement Reconnaissance Report Section 905(b) Analysis. U.S. Army Corps of Engineers, Galveston District. October 2002.

U.S. Environmental Protection Agency (EPA). 1989. Draft Environmental Impact Statement, Freeport Harbor (45-Foot Project), Ocean Dredged Material Disposal Site Designation. EPA 906/01-89-003. U.S. EPA, Region VI, Dallas, Texas.

———. 1990. Final Environmental Impact Statement, Freeport Harbor (45-Foot Project), Ocean Dredged Material Disposal Site Designation. EPA 906/01-90-001. U.S. EPA, Region VI, Dallas, Texas.

U.S. Environmental Protection Agency/U.S. Army Corps of Engineers. 1991. Evaluation of Dredged Material Proposed for Ocean Disposal, Testing Manual. EPA-503/891/001. 205 pp + Appendices.

Barry A. Vittor & Associates, Inc. 1993. Post-Disposal Benthic Macroinfaunal Analysis of the Freeport Harbor, Texas, Ocean Dredged Material Disposal Site, October, 1993.

———. 1994. Post-Disposal Benthic Macroinfaunal Analysis of the Freeport Harbor, Texas, Ocean Dredged Material Disposal Site, February 1993.

Waters, J.K., R.H. Mayer, and D.H. Kriebel. 2000. Shipping Trends Analysis, Dept. of Naval Architecture and Ocean Engineering. United States Naval Academy for Institute for Water Resources. USACE (September 2000).

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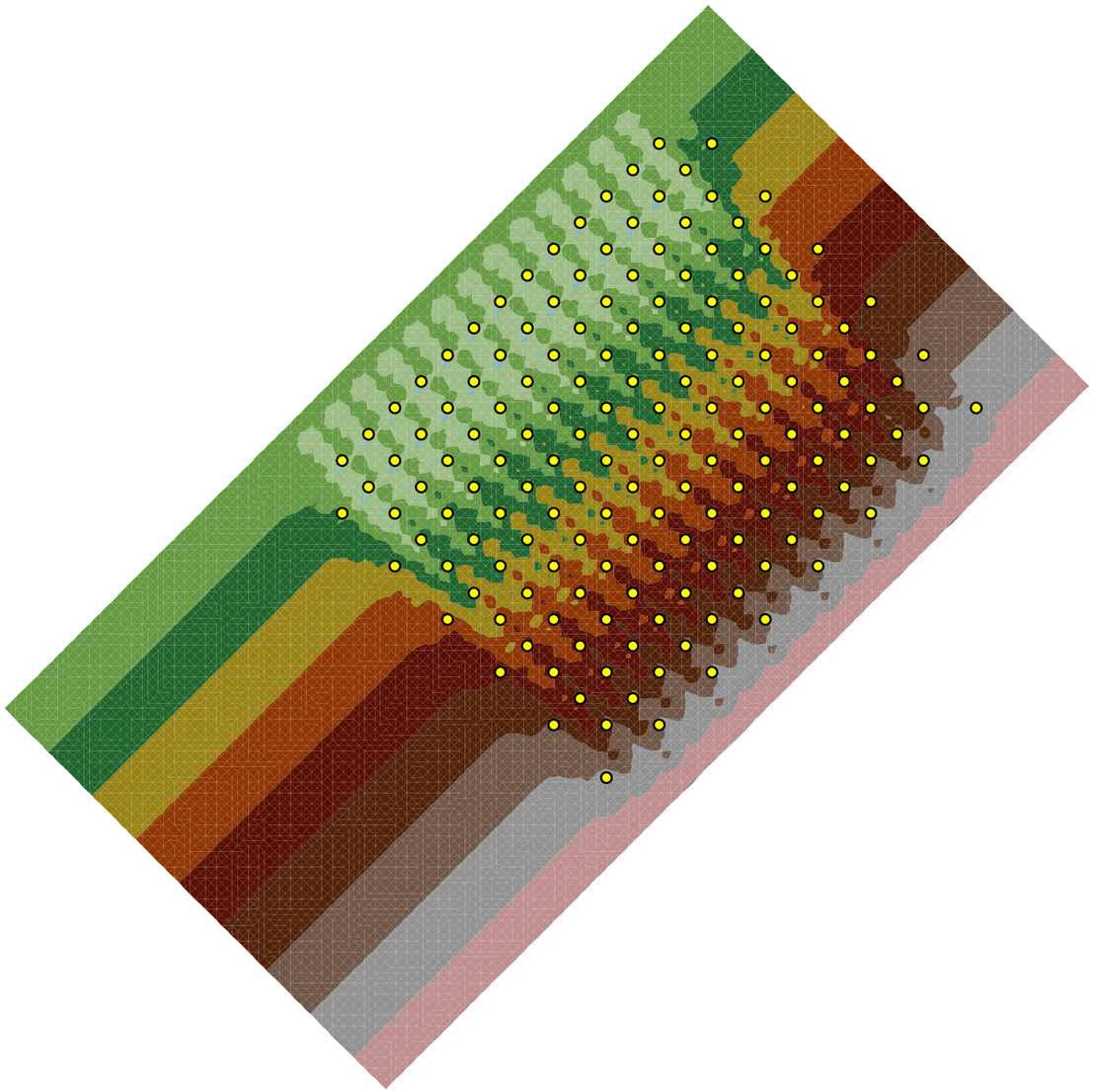
Attachment A

MDFATE Modeling Results



N

5,000 2,500 0 5,000 Feet

Legend

Discharge points

Tin

Elevation

-53.000 - -52
-54.000 - -53
-55.000 - -54
-56.000 - -55
-57.000 - -56
-58.000 - -57
-59.000 - -58
-60.000 - -59
-61.000 - -60
-62.000 - -61
-62.734 - -62

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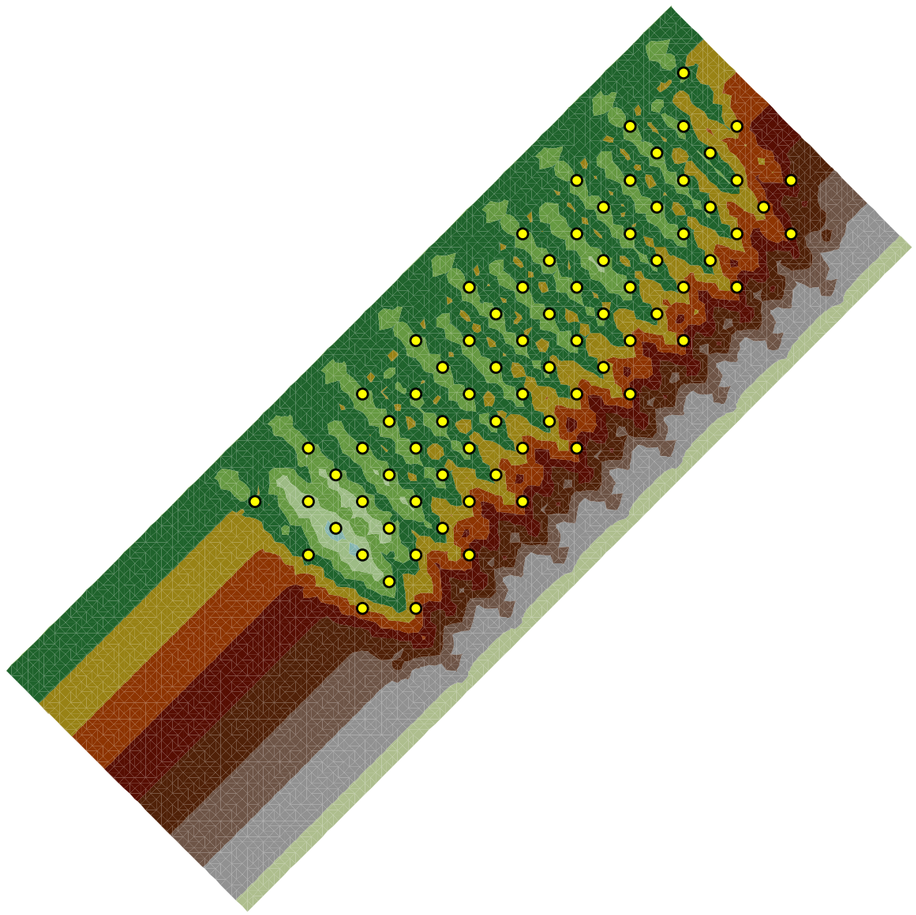
Freeport Widening
Virgin Material ODMDS

Prepared for:	
Job No.:	Scale:
Prepared by:	Date:
File:	



N

5,000 2,500 0 5,000 Feet

Legend

- Discharge Points
- **Tin**
- **Elevation**
  - -29.000 - -28
  - -30.000 - -29
  - -31.000 - -30
  - -32.000 - -31
  - -33.000 - -32
  - -34.000 - -33
  - -35.000 - -34
  - -36.000 - -35
  - -37.000 - -36
  - -38.000 - -37
  - -38.358 - -38

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Freeport Widening Maintenenace Material ODMDS

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Prepared by:	Date:
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Attachment B

Site Management and Monitoring Plan

FREEPORT HARBOR, TEXAS

ODMDS MANAGEMENT PLAN FOR THE MAINTENANCE SITE

AS REQUIRED BY

SECTION 102 OF THE

MARINE PROTECTION, RESEARCH AND SANCTUARIES ACT

ATTACHMENT B
SITE MANAGEMENT PLAN

FREEPORT HARBOR, TEXAS
OCEAN DREDGED MATERIAL DISPOSAL SITE

I. General

The Marine Protection, Research and Sanctuaries Act (MPRSA) of 1972 (33 U.S.C. Section 1401, *et seq.*) is the legislative authority regulating the disposal of dredged material into ocean waters, including the territorial sea. The transportation of dredged material for the purpose of placement into ocean waters is permitted by the U. S. Army Corps of Engineers (USACE) or, in the case of Federal projects, authorized for disposal under MPRSA Section 103(e), applying environmental criteria established by the Environmental Protection Agency in the Ocean Dumping Regulations (40 CFR Parts 220-229).

Section 102(c) of the MPRSA and 40 CFR 228.4(e)(1) authorize the Environmental Protection Agency (EPA) to designate ocean dredged material disposal sites (ODMDSs) in accordance with requirements at 40 CFR 228.5 and 228.6. Section 103(b) of MPRSA requires that the USACE use dredged material sites designated by EPA to the maximum extent feasible. Where use of an EPA-designated site is not feasible, the USACE may, with concurrence of EPA, select an alternative site in accordance with MPRSA 103(b).

Section 228.3 of the Ocean Dumping Regulations established disposal site management responsibilities; however, the Water Resources Development Act of 1992 (WRDA 92; Public Law 102-580) included a number of amendments to the MPRSA specific to ODMDS management. Section 102(c) of MPRSA as amended by Section 506 of WRDA 92 provides that:

1. Site management plans shall be developed for each ODMDS designated pursuant to Section 102(c) of MPRSA.

2. After January 1, 1995, no ODMDS shall receive a final designation unless a site management plan has been developed.

3. For ODMDSs that received a final designation prior to January 1, 1995, site management plans shall be developed as expeditiously as practicable, but no later than January 1, 1997, giving priority to sites with the greatest potential impact on the environment.

4. Beginning on January 1, 1997, no permit or authorization for dumping shall be issued for a site unless it has received a final designation pursuant to Section 102(c) MPRSA or it is an alternate site selected by the USACE under Section 103(b) of MPRSA.

This site management plan for the Freeport Harbor, TX Ocean Dredged Material Disposal Site was developed jointly by the U.S. Environmental Protection Agency, Region 6 (EPA, Region 6) and the U.S. Army Corps of Engineers, Galveston District (USACE, GD). In accordance with Section 102(c)(3) of the MPRSA, as amended by WRDA 92, the plan includes the following:

1. A baseline assessment of conditions at the site;

2. A program for monitoring the site;

3. Special management conditions or practices to be implemented at the site that are necessary for protection of the environment;

4. Consideration of the quantity of dredged material to be discharged at the site, and the presence, nature, and bioavailability of the contaminants in the material;

5. Consideration of the anticipated use of the site over the long term, including the anticipated closure date for the site, if applicable, and any need for management of the site after the closure;

6. A schedule for review and revision of the plan.

II. Site Management Objectives

The purpose of ocean dredged material site management is to ensure that placement activities do not unreasonably degrade the marine environment or interfere with other beneficial uses (e.g., navigation) of the ocean. The specific objectives of management of the Freeport Harbor, TX Ocean Dredged Material Disposal Site for maintenance material are as follows:

1. Ocean discharge of only that dredged material that satisfies the criteria set forth in 40 CPR Part 227 Subparts B, C, D, E, and G and Part 228.4(e) and is suitable for unrestricted placement at the ODMDS;

2. Avoidance of excessive mounding either within the site boundaries or in areas adjacent to the site, as a direct result of placement operations.

III. Roles and Responsibilities

In accordance with Section 102 (c) of the MPRSA and with the Regional MOU between USACE, GD and EPA, Region 6 on Management of ODMDSs signed August 13, 1993, EPA is responsible for designation of ODMDSs. Where use of an EPA-designated site is not feasible, the USACE, GD may, with concurrence with EPA, Region 6 select an alternative site in accordance with Section 103(b) of the MPRSA as amended by Section 506 of WRDA 1992.

Development of Site Management Plans for ODMDSs within the Galveston District is the joint responsibility of EPA, Region 6 and the USACE, GD. Both agencies are responsible for assuring that all components of the Site Management Plans are implementable, practical, and applicable to site management decision-making.

IV. Funding

Physical, chemical, and biological effects-based testing of dredged material prior to placement at the ODMDS will be undertaken and funded by the USACE, GD. The USACE, GD will also be responsible for costs associated with placement site hydrographic monitoring. Should monitoring indicate that additional studies and/or tests are needed at the ODMDS, the cost for such work would be shared by the USACE, GD and EPA, Region 6. Physical, chemical, and biological effects-based testing at the ODMDS, or in the site environs after discharge, that is not required as a result of hydrographic

monitoring, will be funded by EPA, Region 6. Funding of all aspects of this site management plan is subject to Congressional budget constraints.

V. Baseline Assessment

A. Site Characterization (Existing Maintenance ODMDS). The Freeport Harbor Maintenance ODMDS is located approximately three miles offshore, and about 1,000 feet southwest of the centerline of the Outer Bar Channel. The site is rectangular in shape with corner coordinates located at:

28˚54'00"N, 95˚15'49"W; 28˚53'28"N, 95˚15'16"W;
28˚52'00"N, 95˚16'59"W; 28˚52'32"N, 95˚17'32"W.

This site occupies an area of approximately 1.53 square nautical miles, with depths ranging from 31 to 38 feet. The sediment reference area is located northeast of the channel with vertices at the following coordinates:

28˚54'28"N, 95˚13'40"W; 28˚54'35"N, 95˚13'28"W;
28˚55'07"N, 95˚14'01"W; 28˚54'60"N, 95˚14'13"W.

B. Site Characterization (Historic Virgin Material ODMDS). The Freeport Harbor one-time use historic virgin material ODMDS is located approximately six miles offshore, with its area bounded by the following coordinates:

28˚50'51"N, 95˚13'54"W; 28˚51'44"N, 95˚14'49"W;
28˚50'15"N, 95˚16'40"W; 28˚49'22"N, 95˚15'45"W

The site occupies and area of approximately 2.64 nautical square miles, with depths ranging from 54 to 63 ft.

Baseline conditions at the Freeport Harbor Maintenance and historic Virgin Material ODMDSs were assessed during the site designation process. Details of baseline conditions, including descriptions of the marine environment in the site vicinity and the physical, chemical and biological characteristics of the sediments and the water column at the site, are contained in the Final Environmental Impact Statement (EIS), Freeport Harbor (45-Foot Project), Ocean Dredged Material Disposal Site Designation prepared by EPA, Region 6, in January 1990.

C. Historical Use of Site (Maintenance Material ODMDS). The Freeport Harbor maintenance ODMDS received final designation on March 27, 1990 (55 FR 59). Historical use of the site is depicted below.

D. Historical Use of Site (Virgin Material ODMDS). The Virgin Material ODMDS was designated (EPA, 1990) for one-time use for the 45-ft channel project for placement of 5.1 million cubic yards of new work (virgin) material. This site has been inactive since completion of the 45-ft channel project.

Dredging History

Start	Finish	Dredge Work Type	Prescribed Yards	Over-Depth Yards	Total Yards
Aug-92	Nov-92	Maintenance	2,262,716	621,816	2,884,532
Jul-93	Sep-93	Maintenance	1,415,742	0	1,415,742
Aug-94	Nov-94	Maintenance	2,599,267	0	2,599,267
Sep-95	Jan-96	Maintenance	2,081,837	592,189	2,674,026
Jul-96	Aug-96	Maintenance	579,500	0	579,500
Jan-97	Apr-97	Maintenance	1,886,633	602,475	2,489,108
Nov-97	Dec-97	Maintenance	703,453	349,704	1,053,157
Oct-98	Dec-98	Maintenance	1,860,017	474,419	2,334,436
Sep-99	Jan-00	Maintenance	1,093,696	461,919	1,555,615
Jul-00	Nov-00	Maintenance	1,241,830	618,017	1,859,847
Oct-00	Jan-01	Maintenance	2,202,288	0	2,202,288
Jun-01	Sep-01	Maintenance	1,956,384	522,865	2,479,249
May-02	Aug-02	Maintenance	1,996,354	0	1,996,354
Aug-03	Oct-03	Maintenance	1,726,186	0	1,726,186
Sep-04	Nov-04	Maintenance	1,249,655	659,176	1,908,831
TOTAL SINCE 1992					
No. yrs	13	years/cycle	0.87	Total cy	29,758,138
No. dredgings	15	months/cycle	10.4	cy/cycle	1,983,876

VI. Quantity of Material and Level of Contamination

A. Summary of information used to determine size of the site. Historically, since 1992, the dredging frequency for this navigation project is slightly less than one year or approximately 10 months, with an average of approximately 1,983,876 cubic yards (cy) of material excavated per dredging cycle placed at the maintenance ODMDS. The excavated channel sediments can be characterized as clayey-sandy-silts. The channel sediment may contain a slightly higher percentage of sand than the placement area, and slightly less than the reference area, however, the percentage of silt is similar for all three locations. Average particle size distribution is described in the table below.

LOCATION	% SAND	% SILT	% CLAY
Channel	19.6	52.0	28.4
ODMDS	5.4	66.4	28.2
Reference Area	26.9	56.6	16.5

As described in the site designation EIS, the size of the maintenance ODMDS and virgin material ODMDS were determined by simulations run on a computer model. These simulations assumed an average of 1.98 million cy (mcy) of material to be placed during each maintenance cycle and 2.9 mcy to be placed as part of the widening project. The 1.98 mcy of future maintenance material quantity is not significantly different from the 2.1 mcy of maintenance material simulated during the designation process for the existing maintenance ODMDS (EPA, 1990). Additionally, the 2.9 mcy of virgin material is much less than the 5.1 mcy of virgin material simulated during the designation process for the historic virgin material ODMDS (EPA, 1990). Both sites can be described as dispersive, therefore the dredged material deposited there is expected to erode, especially due to the high percentage of fine-grain components

B. Summary of testing requirements per Regional Implementation Agreement (RIA) and summary of past dredged material evaluations. In July 2003, an RIA was executed between EPA Region 6, and the Galveston District. This RIA described protocols for evaluating the quality of the dredged material and implementation of the Evaluation of Dredged Material Proposed for Ocean Disposal Testing Manual dated February 1991. These protocols describe chemical parameters to be analyzed, as well as required detection limits. It also specifies how toxicity testing and bioaccumulation assessments are to be conducted, as well as organisms to be utilized. Since that time, all sediment evaluations have been conducted in accordance with the RIA. Since the mid-1970's, before development of the RIA, dredged material from the Freeport Harbor Project had been evaluated numerous times to determine suitability for offshore placement. This testing was performed to determine levels of metals and organic constituents, as well as toxicity and bioaccumulation assessments. Testing performed for this project is summarized in the following table:

DATE	TYPE OF TESTING
September 17, 1975	Pre-dredging Bulk Analyses
October 6, 1975	During-dredging Bulk Analyses
December 2, 1975	After-dredging Bulk Analyses
April 1978	Toxicity and Bioaccumulation Assmnt.
October 1978	Toxicity and Bioaccumulation Assmnt.
July 1980	Toxicity and Bioaccumulation Assmnt.
January 14, 1982	Pre-dredging Bulk Analyses

DATE	TYPE OF TESTING
February 22, 1983	Pre-dredging Bulk Analyses
July 3, 1984	Pre-dredging Bulk Analyses
February 1985	Toxicity and Bioaccumulation Assmnt.
May 15, 1985	Pre-dredging Bulk Analyses
March 28, 1986	Pre-dredging Bulk Analyses
March 18, 1987	Pre-dredging Bulk Analyses
March 15, 1988	Pre-dredging Bulk Analyses
April 7, 1989	Pre-dredging Bulk Analyses
July 20, 1993	Pre-dredging Bulk Analyses
September 1994	Toxicity and Bioaccumulation Assmnt.
February 2, 1995	Pre-dredging Bulk Analyses

The results of the above testing indicated that the material was suitable for offshore placement without special management conditions.

VII. Anticipated Site Use

The maintenance dredging frequency for the widened project is estimated to be once every 14 months, with an average of approximately 1.98 mcy of maintenance dredge material to be placed at the existing maintenance ODMDS. Presently, the maintenance ODMDS receives on the average of 1.98 mcy of maintenance dredged material at a frequency of once every 10 months.

The new work construction project will generate approximately 2.9 mcy of virgin material to be placed within the proposed virgin material ODMDS previously designated by EPA for the one-time placement of up to 5.1 mcy of virgin dredged material for the 45-ft channel project.

Currently, no beneficial use of material dredged from Freeport Harbor is practiced. It is the policy of the Galveston District to require implementation of beneficial uses of dredged material, wherever practicable. However, the DMMP working group examined various beneficial uses of dredged material placement but did not identify any practicable alternatives.

VIII. Special Management Conditions or Practices

Currently, no special management conditions or practices related to placement of dredged material into the designated ODMDS have been required. As previously discussed, evaluations of sediment quality have indicated that the material from the channel is suitable for offshore placement without such requirements.

IX. Monitoring Program

The primary purpose of the Site Monitoring Program is to evaluate the impact of the placement of dredged material on the marine environment resulting from the redesignation of the historic virgin material ODMDS for one-time use. Since the future maintenance material quantities are expected to be no more than the designation quantities for the maintenance ODMDS, the site monitoring program adopted during the original designation process will apply.

The evaluations will be used for making decisions which will prevent unacceptable adverse effects beyond the site boundary, and will ensure regulatory compliance the proposed redesignation of the virgin material ODMDS. Emphasis will be placed on determining physical impacts of the virgin dredged material generated by the Freeport Harbor Widening project, since to date, the dredged material from the Freeport Harbor Widening Project has been determined to be acceptable for ocean placement, without special conditions.

The size and location of the Freeport Harbor virgin material ODMDS was determined pursuant to the General Criteria as listed in 40 CFR 228.5, and the Specific Criteria at 40 CFR 228.6(a). There are no significant environmental resources delineated within or immediately outside of the designated ODMDS. Since this site is dispersive in nature, the primary concern of the use of this site is the potential short-term build up of dredged material, such that a hazard to navigation is presented. Another concern is whether there is significant short-term transport of the dredged material beyond the ODMDS boundary, specifically, the benthic community can be impacted if significant rapid movement of material off the site occurs, resulting in burial of benthic populations outside the ODMDS.

The Site Monitoring Program is designed as a hypothesis testing, tiered program. If initial tier results fail predetermined limits (i.e., the null hypothesis is rejected), then a more complex set of tests are invoked at the next tier to determine the extent of impact. The tiers are used to facilitate rapid, accurate and economical collection of information for use by the EPA, Region 6 and the USACE, GD. The tiered hypothesis testing for these factors is described below.

TIER l - NULL HYPOTHESIS (Ho).

Deposited dredged material is not mounding to elevations greater than 5.0 feet above the existing bottom elevation; and there is no short-term transport of material beyond the limits of the ODMDS.

Hypothesis Testing

Hydrographic surveys will be obtained before the start of disposal operations, and upon completion of disposal operations.

The ODMDS is located outside of the safety fairway for large vessel traffic, therefore, the mounding will be considered in regard to shallow-draft vessels, only. Considering the grain-size characteristics of typical maintenance dredged material from this channel, significant mounding is not expected subsequent to discharge operations. The threshold elevation for mounding of dredged material within the ODMDS will be 5.0 feet above the existing bottom elevation.

Since the site is dispersive, movement of material from the site is expected to occur after completion of disposal operations. The post-disposal surveying will serve only to detect if the short-term movement of the material out of the designated ODMDS is occurring at a significant rate.

Studies have shown that benthic organisms can burrow through 6-9 inches of dredged material without significant impacts on the community. Therefore, a depth of 1.0 foot of sedimentation along the ODMDS boundary will be considered the threshold level for movement of material outside of the designated ODMDS.

Management Options

If the Null Hypothesis is satisfied at the completion of disposal operations, further post-disposal

monitoring will not occur.

If mounding, and/or movement of material out of the ODMDS have occurred, as determined by the post-dredging survey, the Null Hypothesis will be rejected, and the monitoring program will proceed to Tier 2.

TIER 2-H_0

Deposited dredged material is not mounding to elevations greater than 10.0 feet above the existing bottom elevation; and/or there is no significant short-term transport of material beyond the limits of the ODMDS.

Hypothesis Testing

If transport of material from the site is occurring, hydrographic surveys will be expanded to include the impacted areas and will be performed on a semi-annual basis to determine the changes in dispersion of the material until the impacts no longer occur. A depth of more than 1.0 foot of sedimentation along the ODMDS boundary will be considered the threshold level for significant movement of material outside of the designated ODMDS.

Management Options

If the Null Hypothesis is satisfied at the completion of disposal operations, semi-annual post-disposal monitoring will occur as described.

If significant mounding, and/or significant movement of material out of the ODMDS have occurred, as determined by the after-dredging surveys, the Null Hypothesis will be rejected, and the USACE, GD together with EPA Region 6 will consider various management options to rectify the situation. Such options could include, but are not limited to: Designation of sequential discharge points; Expansion of the ODMDS; or Relocation of the ODMDS within the zone of siting feasibility described in the designation EIS.

Data Collection

Hydrographic surveys will be conducted along transects within the ODMDS. These transects will be oriented perpendicular to the channel in the direction of sediment transport (i.e., southwest). Transect intervals will be every l,000 feet extending 1,000 feet outside each boundary. In addition, a depth profile will be obtained along the boundary.

Surveys will be obtained using a Corps of Engineers, or contract survey vessel equipped with electronic surveying capabilities. The vessel is equipped with microwave positioning equipment that has a horizontal precision of 1 ft. The fathometer, which will display real time depth on real time location, has a precision of 0.5 ft. All data will be collected using methodology described in Engineer Manual EM 1110-2-1003, dated February 28, 1991.

X. Site Management Plan Review and Revision

Pursuant to Section 102(c) of the MPRSA, as amended by WRDA 1992, the site management plan for the Freeport Harbor ODMDS will be reviewed and revised, if necessary, not less frequently than 10 years after adoption and every 10 years, thereafter.

Modifications or updates to the site management plan may be necessary, based on specific needs identified for specific authorized projects. Modifications or updates to the site management plan may be proposed by either the USACE, GD or EPA Region 6. Following a thirty (30) day review period of the changes(s), the modifications may be incorporated into the plan by mutual consent of both agencies.

This Site Management Plan complies with Section 102(c)(3) of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. Sections 1401, et seq.) as amended by Section 506 of the Water Resources Development Act of 1992 (WRDA 92; Public Law 102-580), and has been approved by the following officials of Region 6 of the U.S. Environmental Protection Agency, and Galveston District of the U.S. Army Corps of Engineers. This plan goes into effect upon the date of the last signature:

Richard E. Greene — Date
Regional Administrator
U.S. Environmental Protection Agency,
Region 6

Arthur J. Janecka — Date
Deputy District Engineer and
Chief, Project and Programs Management Division
U.S. Army Corps of Engineers, Galveston District